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| Mr. Michael T. Davis  Calculus | | Chapter 3 Practice Test  January 19, 2017 | |
| Name: | |

1. Sketch the graph of a continuous function that has the following properties:



i. ,

ii. .

1. Sketch the graph of a continuous function that has the following properties:



i.,

ii.

1. Write an equation for a linear function that has the following properties:

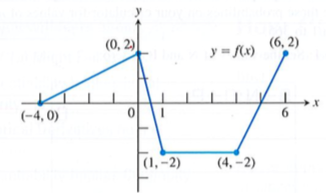


i. ,

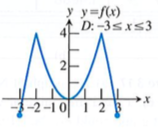
ii. .

1. The function  has left-hand and right-hand derivatives at . Does  have a derivative at ? Explain why or why not. You may use the derivative rules here.
2. Use either definition  or  to find the derivative of the function  at . You may NOT use the derivative rules here, and you MUST carefully show all the steps in the process.

1. If  and , write an equation of the tangent line to the graph of  at the point where .
2. If  and , write an equation of the normal line to the graph of  at the point where .
3. The graph of the function  shown here is made of the line segments joined end to end. Graph the function’s derivative function.



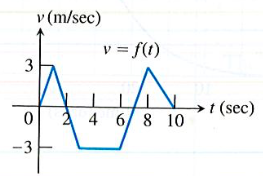
1. Determine the value(s) of x for which the function  is not differentiable. Explain why.
2. Given the function , use your calculator to determine the numerical derivative of the given function at the point  using . Write clearly on this paper the expression you enter on your calculator.
3. The graph of a function  is shown below. State the values of x for which the function is not differentiable. Explain why.



1. Find  for the function 
2. Find  for the function 
3. Find  for the function 
4. Find  for the function 
5. Find  for the function 
6. Find  for the function 
7. Find  for the function 
8. Find  for the function 
9. Given that functions  and  are differentiable at  and that , , , and . Find the value of each derivative at .

a. 

b. 

1. Write an equation for the line tangent to the graph of  at .
2. Write an equation for the line normal to the graph of  at 
3. Particle Motion. The accompanying figure shows the velocity  of a particle moving on a coordinate line.
4. When does the particle move forward? Justify your answer.
5. When does the particle speed up? Justify your answer.
6. When is the particle’s acceleration negative? Justify your answer.
7. When is the particle’s acceleration zero? Justify your answer.
8. When is the particle’s velocity a constant? Justify your answer.
9. Projectile Motion. A rocket propelled vertically upward from the surface of the Earth at an initial velocity of  reaches a height of  meters in t seconds.
10. Find the rock’s velocity as a function of time.
11. Find the rocket’s acceleration as a function of time.
12. What is the rocket’s velocity and acceleration at time ?
13. How long did it take the rocket to reach its highest point? Justify your answer.
14. How high did the rocket go?
15. Particle Motion. A particle moves along a real number line (left and right) so that its position at any time  is given by the function  where s is measured in meters and t is measured in seconds. Positive velocity implies movement to the right.
16. Determine the particles displacement from  and .
17. Determine the average velocity from  and .
18. Find the instantaneous velocity at any time t.
19. At what time(s) does the particle change direction? Justify your answer.
20. Is the particle moving forward or backward at time ? Justify your answer.
21. What is the particle’s position when it is the farthest to the left? Justify your answer?
22. Given , determine 
23. Given , determine 
24. Given , determine 
25. Given , determine 
26. A body is moving in simple harmonic motion with position function  with  in meters and  in seconds.
27. Find the body’s velocity, speed and acceleration at time 
28. Find the body’s velocity, speed and acceleration at time 
29. Describe all aspects of the motion at time 
30. Find equations for the lines that are tangent and normal to the graph of  at .
31. Multiple Choice: Find an equation for the line that is tangent to the graph of  at .

a. 

b. 

c. 

d. 

e. 

1. Determine the value of x closest to the origin such that  and the tangent line to the graph of  is horizontal.
2. Determine an equation of the line normal to the graph of  at .